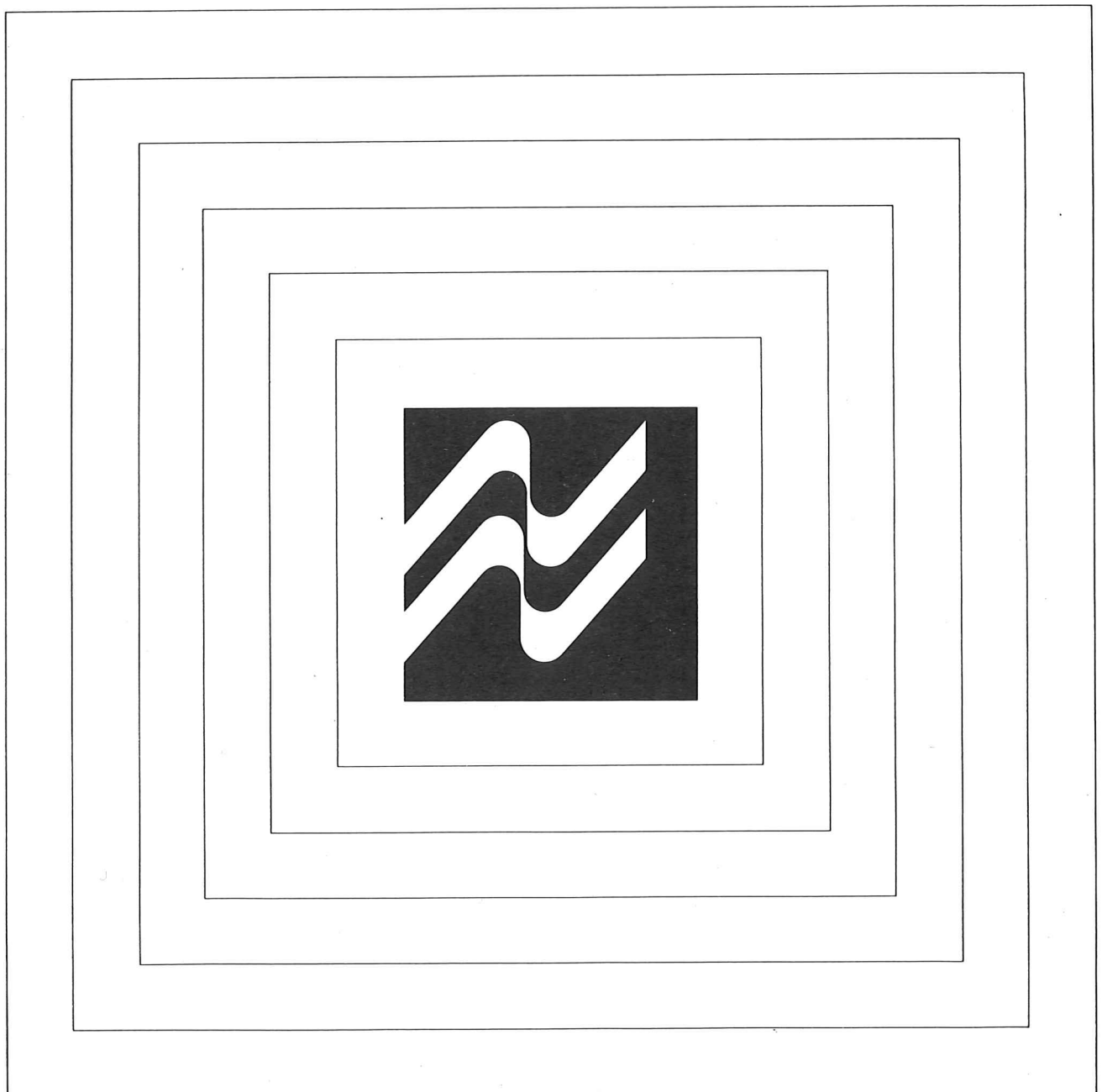


Bipolar
Memory/LSI

PROM
Update

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PROM Update



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Information contained herein is intended to be a general product description and is subject to change.

National Semiconductor Corporation general policy does not recommend the use of its components of any type in "life support applications". National interprets "life support application" to mean a situation wherein failure or malfunction of the National component threatens life or makes injury probable.

We fully recognize that component application within a life support system is not necessarily a "life support application" of that component. In fact, many well designed life support systems have

**WARNING: DO NOT
USE IN LIFE SUPPORT**

no single component in a "life support application".

When National is aware of the use of our commercial grade components within a life support system, we are required to determine whether or not our policy relative to component application is in jeopardy. In such cases we require a written statement, from an officer of the company bearing system responsibility, assuring that a malfunction of our component does not pose direct or indirect threat of injury or death.

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Introduction

GENERAL

This generic Schottky PROM family by National Semiconductor makes available to the industry one of the widest selections in sizes and organizations. 4-bit wide PROM's are provided with 256 to 2048 words in pin compatible 16 and 18 pin dual-in-line packages. The 8-bit wide devices range from 32 to 2048 words in a variety of packages. Being 'generic', all PROM's share a common programming algorithm.

TITANIUM-TUNGSTEN FUSES

National's new Programmable Read-Only Memories (PROM's) feature titanium-tungsten (Ti:W) fuse links designed to program efficiently with only 10.5 Volts applied. The high performance and reliability of these PROM's are the result of fabrication by a Schottky bipolar process, of which the titanium-tungsten metalization is an integral part, and the use of an on-chip programming circuit.

A major advantage of the titanium-tungsten fuse technology is the low programming voltage of the fuse links. At 10.5 Volts, this virtually eliminates the need for guard-ring devices and wide spacings required for other fuse technologies. Care is taken however, to minimize voltage drops across the die and to reduce parasitics. The device is designed to ensure that worst case fuse operating current is low enough for reliable long-term operation. The Darlington programming circuit is liberally designed to insure adequate power density for blowing the fuse links. The complete circuit design is optimized to provide high performance over the entire operating ranges of VCC and temperature.

TESTABILITY

The Schottky PROM die includes extra rows and columns of fusable links for testing the programmability of each chip. These test fuses are placed at the worst case chip locations to provide the highest possible confidence in the programming tests and in the final product. A ROM pattern is also permanently fixed in the additional circuitry and coded to provide a parity check of input address levels. These and other test circuits are used to test for correct operation of the row and column select circuits and functionality of input and enable gates. All test circuits are available at both wafer and assembled device levels to allow 100% functional and parametric testing at every stage of the test flow.

RELIABILITY

As with all National products, the Ti:W PROM's are subjected to an on-going reliability evaluation by the Reliability Assurance Department. These evaluations employ various accelerated life tests, including dynamic high temperature operating life, temperature-humidity life, temperature cycling, and thermal shock. To date, nearly 7.4 million Schottky Ti:W PROM device hours have been logged, with samples in Epoxy B molded DIP (N-package) and Cerdip (J-package). Device performance in all package configurations is excellent.

Bipolar PROM Selection Guide

Size (Bits)	Organization		DIP (Pins)	Part Number	TAA (Max) in nS	TEA (Max) in nS	ICC (Max) in mA	Temperature Celsius
256	32x8	OC	16	DM54S188	45	30	110	-55 to +125
	32x8	OC	16	DM74S188	35	20	110	0 to +70
	32x8	TS	16	DM54S288	45	30	110	-55 to +125
	32x8	TS	16	DM74S288	35	20	110	0 to +70
1024	256x4	OC	16	DM54S387	60	30	130	-55 to +125
	256x4	OC	16	DM74S387	50	25	130	0 to +70
	256x4	TS	16	DM54S287	60	30	130	-55 to +125
	256x4	TS	16	DM74S287	50	25	130	0 to +70
2048	512x4	OC	16	DM54S570	65	35	130	-55 to +125
	512x4	OC	16	DM74S570	55	30	130	0 to +70
	512x4	TS	16	DM54S571	65	35	130	-55 to +125
	512x4	TS	16	DM74S571	55	30	130	0 to +70
4096	512x8	OC	24	DM54S475	75	40	170	-55 to +125
	512x8	OC	24	DM74S475	65	35	170	0 to +70
	512x8	TS	24	DM54S474	75	40	170	-55 to +125
	512x8	TS	24	DM74S474	65	35	170	0 to +70
4096	512x8	OC	24	DM54S475A	60	35	170	-55 to +125
	512x8	OC	24	DM74S475A	45	25	170	0 to +70
	512x8	TS	24	DM54S474A	60	35	170	-55 to +125
	512x8	TS	24	DM74S474A	45	25	170	0 to +70
4096	512x8	OC	20	DM54S473	75	35	155	-55 to +125
	512x8	OC	20	DM74S473	60	30	155	0 to +70
	512x8	TS	20	DM54S472	75	35	155	-55 to +125
	512x8	TS	20	DM74S472	60	30	155	0 to +70
4096	512x8	OC	20	DM54S473A	60	35	155	-55 to +125
	512x8	OC	20	DM74S473A	45	25	155	0 to +70
	512x8	TS	20	DM54S472A	60	35	155	-55 to +125
	512x8	TS	20	DM74S472A	45	25	155	0 to +70
4096	1024x4	OC	18	DM54S572	75	45	140	-55 to +125
	1024x4	OC	18	DM74S572	60	35	140	0 to +70
	1024x4	TS	18	DM54S573	75	45	140	-55 to +125
	1024x4	TS	18	DM74S573	60	35	140	0 to +70
4096	1024x4	OC	18	DM54S572A	60	35	140	-55 to +125
	1024x4	OC	18	DM74S572A	45	25	140	0 to +70
	1024x4	TS	18	DM54S573A	60	35	140	-55 to +125
	1024x4	TS	18	DM74S573A	45	25	140	0 to +70
8192	1024x8	OC	24	DM77S180	75	35	170	-55 to +125
	1024x8	CC	24	DM87S180	55	30	170	0 to +70
	1024x8	TS	24	DM77S181	75	35	170	-55 to +125
	1024x8	TS	24	DM87S181	55	30	170	0 to +70
8192	2048x4	OC	18	DM77S184	75	35	140	-55 to +125
	2048x4	OC	18	DM87S184	55	30	170	0 to +70
	2048x4	TS	18	DM77S185	75	35	140	-55 to +125
	2048x4	TS	18	DM87S185	55	30	170	0 to +70
6384	2048x8	OC	24	DM77S190	80	40	175	-55 to +125
	2048x8	OC	24	DM87S190	65	30	175	0 to +70
	2048x8	TS	24	DM77S191	80	40	175	-55 to +125
	2048x8	TS	24	DM87S191	65	30	175	0 to +70



National Semiconductor

DM54/74S188 ,DM54/74S288
(32x8) 256-BIT TTL PROMs

General Description

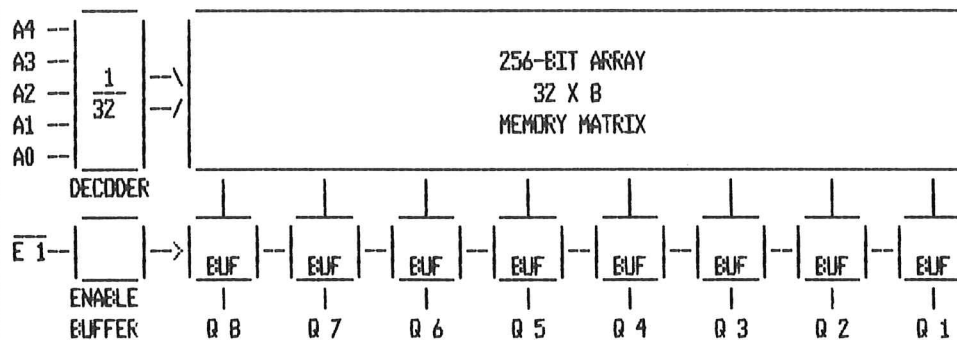
These Schottky memories are organized in the popular 32 words by 8 bits configuration. A memory enable input is provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

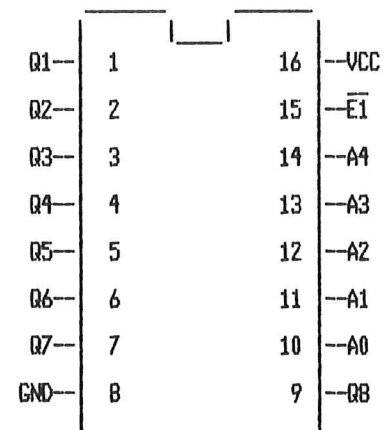
- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-22 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S188		X	X		N,J
DM74S288		X		X	N,J
DM54S188	X		X		J
DM54S288	X			X	J

Block diagram



Connection Diagram



Order Number ;
 DM74S188 J, DM74S288 J,
 DM54S188 J, or DM54S288 J
 See NS Package J16A

Order Number ;
 DM74S188 N or DM74S288 N
 See NS Package N16A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S188/288	4.50	5.50	V
DM74S188/288	4.75	5.25	V
Ambient Temperature (TA)			
DM54S188/288	-55	+125	C
DM74S188/288	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S188/288			DM74S188/288			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHz, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		70	110		70	110	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V Chip Disabled			+50			+50	uA
				-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S188/288			DM74S188/288			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		22	45		22	35	nS
TEA Enable Access Time	TEVQV		15	30		15	20	nS
TER Enable Recovery Time	TEXQX		15	35		15	25	nS
TZX Output Enable Time	TEVQX		15	30		15	20	nS
TXZ Output Disable Time	TEXQZ		15	35		15	25	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.

All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.

Permanent damage may otherwise result.

National Semiconductor

DM54/74S387 ,DM54/74S287
(256x4) 1024-BIT TTL PROMs

General Description

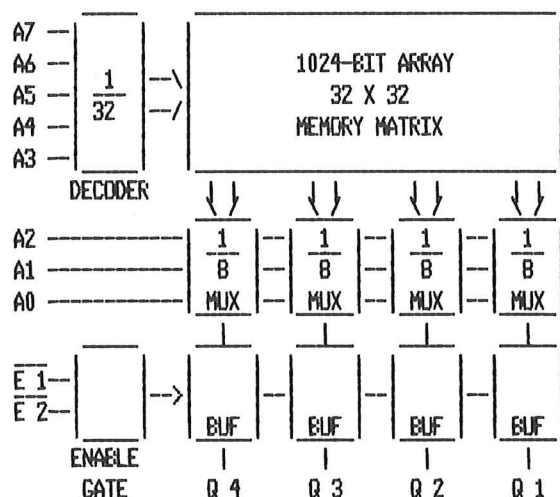
These Schottky memories are organized in the popular 256 words by 4 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 4 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-35 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

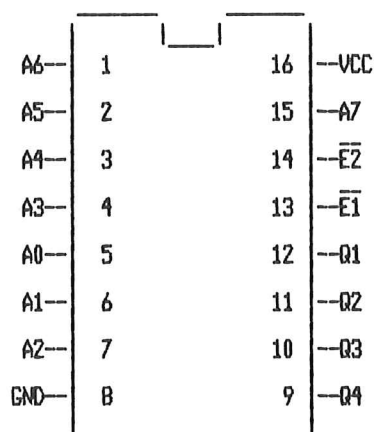
	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S387		X	X		N,J
DM74S287		X		X	N,J
DM54S387	X		X		J
DM54S287	X			X	J

Block diagram



Order Number ;
 DM74S387 J, DM74S287 J,
 DM54S387 J, or DM54S287 J
 See NS Package J16A

Connection Diagram



Order Number ;
 DM74S387 N or DM74S287 N
 See NS Package N16A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S387/287	4.50	5.50	V
DM74S387/287	4.75	5.25	V
Ambient Temperature (TA)			
DM54S387/287	-55	+125	C
DM74S387/287	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S387/287			DM74S387/287			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHz, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		80	130		80	130	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V Chip Disabled			+50			+50	uA
				-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S387/287			DM74S387/287			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		35	60		35	50	nS
TEA Enable Access Time	TEVQV		15	30		15	25	nS
TER Enable Recovery Time	TEXQX		15	30		15	25	nS
TZX Output Enable Time	TEVQX		15	30		15	25	nS
TXZ Output Disable Time	TEXQZ		15	30		15	25	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.
For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.
All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.
Permanent damage may otherwise result.

National Semiconductor

DM54/74S570 ,DM54/74S571
(512x4) 2048-BIT TTL PROMs

General Description

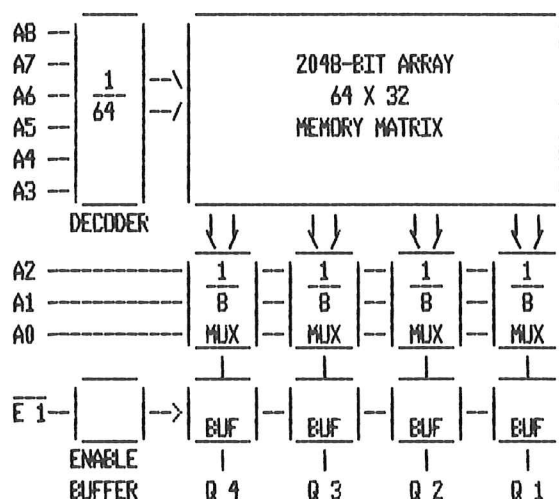
These Schottky memories are organized in the popular 512 words by 4 bits configuration. A memory enable input is provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 4 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-20 nS typ
 - Enable recovery-20 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

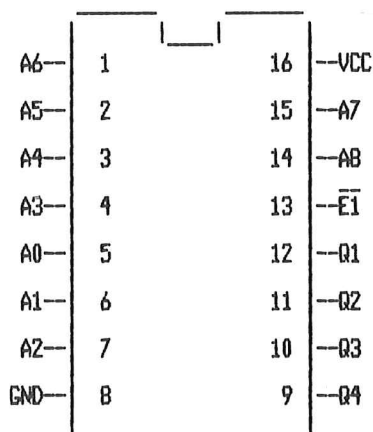
	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S570		X	X		N,J
DM74S571		X		X	N,J
DM54S570	X		X		J
DM54S571	X			X	J

Block diagram



Order Number ;
 DM74S570 J, DM74S571 J,
 DM54S570 J, or DM54S571 J
 See NS Package J16A

Connection Diagram



Order Number ;
 DM74S570 N or DM74S571 N
 See NS Package N16A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM548570/571	4.50	5.50	V
DM748570/571	4.75	5.25	V
Ambient Temperature (TA)			
DM548570/571	-55	+125	C
DM748570/571	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM548570/571			DM748570/571			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHZ, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		90	130		90	130	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V			+50			+50	uA
	Chip Disabled			-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM548570/571			DM748570/571			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		40	65		40	55	nS
TEA Enable Access Time	TEVQV		20	35		20	30	nS
TER Enable Recovery Time	TEXQX		20	35		20	30	nS
TZX Output Enable Time	TEVQX		20	35		20	30	nS
TXZ Output Disable Time	TEXQZ		20	35		20	30	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.
For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.
All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.
Permanent damage may otherwise result.

National Semiconductor

DM54/74S475 ,DM54/74S474 (512x8) 4096-BIT TTL PROMs

General Description

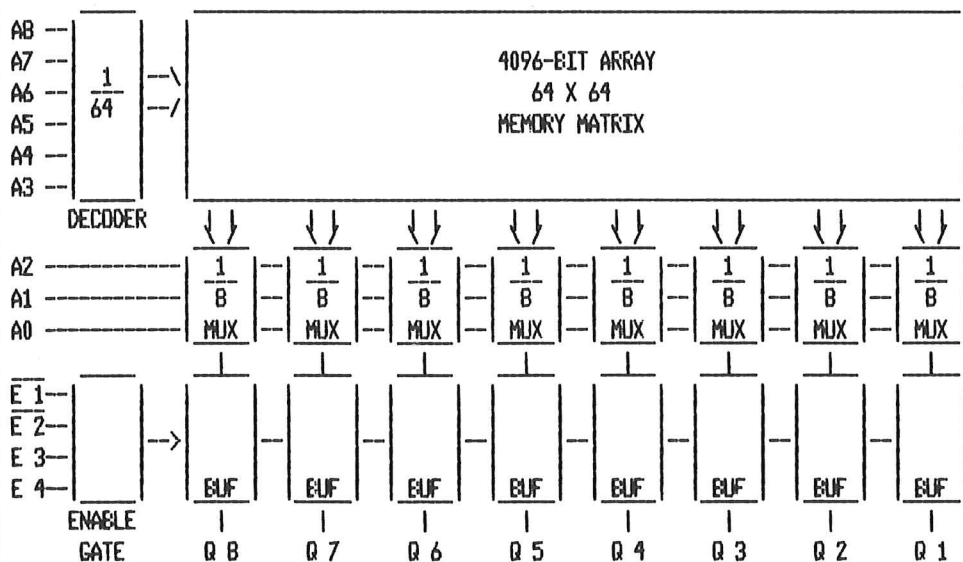
These Schottky memories are organized in the popular 512 words by 8 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

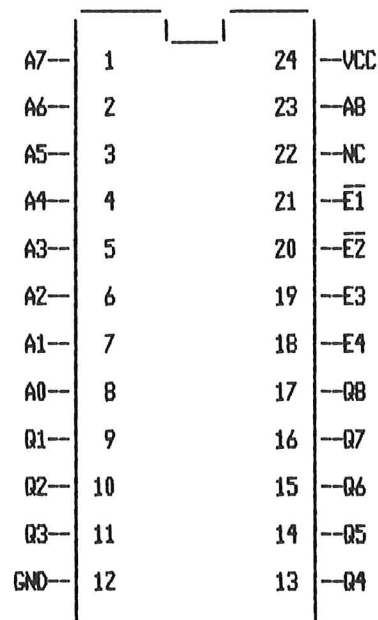
- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-20 nS typ
 - Enable recovery-20 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S475		X	X		N,J
DM74S474		X		X	N,J
DM54S475	X		X		J
DM54S474	X			X	J

Block diagram



Connection Diagram



Order Number ;

DM74S475 J, DM74S474 J,
DM54S475 J, or DM54S474 J
See NS Package J24A

Order Number ;

DM74S475 N or DM74S474 N
See NS Package N24A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S475/474	4.50	5.50	V
DM74S475/474	4.75	5.25	V
Ambient Temperature (TA)			
DM54S475/474	-55	+125	C
DM74S475/474	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S475/474			DM74S475/474			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHZ, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		115	170		115	170	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V			+50			+50	uA
	Chip Disabled			-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S475/474			DM74S475/474			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		40	75		40	65	nS
TEA Enable Access Time	TEVQV		20	40		20	35	nS
TER Enable Recovery Time	TEXQX		20	40		20	35	nS
TZX Output Enable Time	TEVQX		20	40		20	35	nS
TXZ Output Disable Time	TEXQZ		20	40		20	35	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.

All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.

Permanent damage may otherwise result.

DM54/74S475A, DM54/74S474A (512x8) 4096-BIT TTL PROMs

General Description

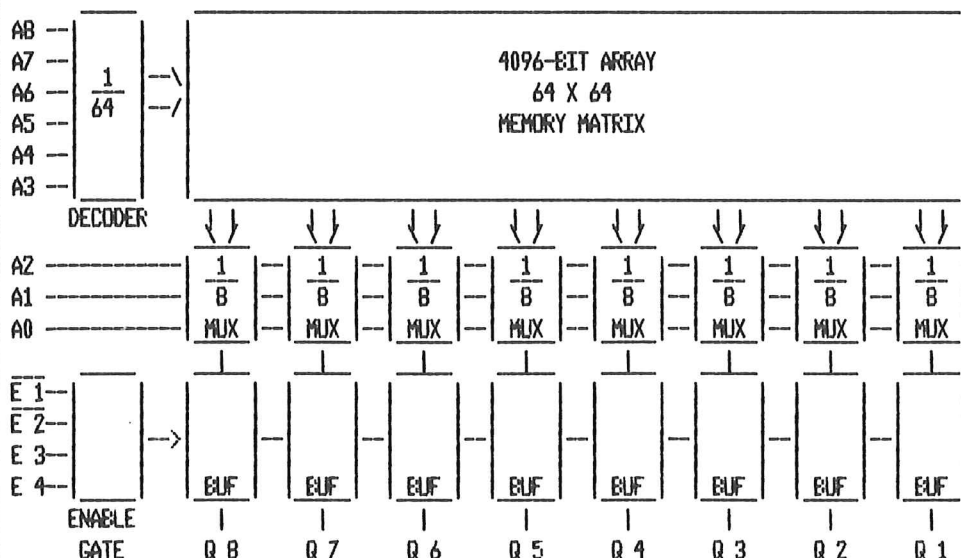
These Schottky memories are organized in the popular 512 words by 8 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

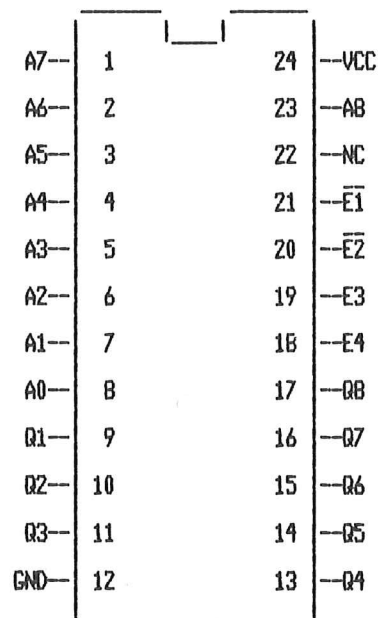
- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-30 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S475A		X	X		N,J
DM74S474A		X		X	N,J
DM54S475A	X		X		J
DM54S474A	X			X	J

Block diagram



Connection Diagram



Order Number ;
DM74S475AJ, DM74S474AJ,
DM54S475AJ, or DM54S474AJ
See NS Package J24A

Order Number ;
DM74S475AN or DM74S474AN
See NS Package N24A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S475A/474A	4.50	5.50	V
DM74S475A/474A	4.75	5.25	V
Ambient Temperature (TA)			
DM54S475A/474A	-55	+125	C
DM74S475A/474A	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S475A/474A			DM74S475A/474A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHz, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		115	170		115	170	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V			+50			+50	uA
	Chip Disabled			-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S475A/474A			DM74S475A/474A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		30	60		30	45	nS
TEA Enable Access Time	TEVQV		15	35		15	25	nS
TER Enable Recovery Time	TEXQX		15	35		15	25	nS
TZX Output Enable Time	TEVQX		15	35		15	25	nS
TXZ Output Disable Time	TEXQZ		15	35		15	25	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise. All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded. Permanent damage may otherwise result.

National Semiconductor

DM54/74S473 ,DM54/74S472
(512x8) 4096-BIT TTL PROMs

General Description

These Schottky memories are organized in the popular 512 words by 8 bits configuration. A memory enable input is provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions.

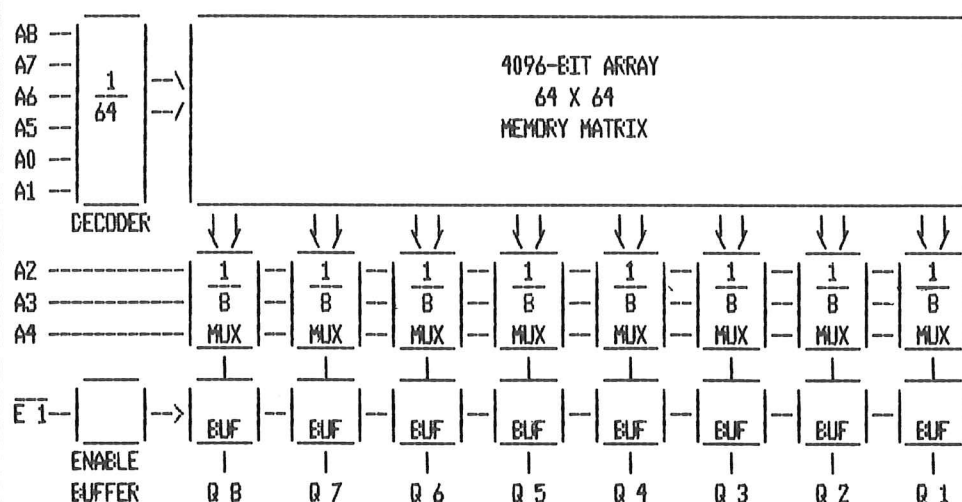
PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

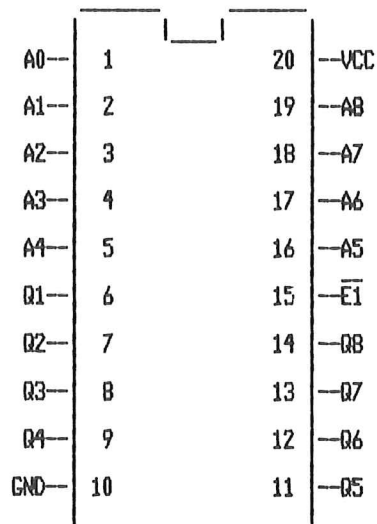
	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S473		X	X		N,J
DM74S472		X		X	N,J
DM54S473	X		X		J
DM54S472	X			X	J

Block diagram



Order Number ;
 DM74S473 J, DM74S472 J,
 DM54S473 J, or DM54S472 J
 See NS Package J20B

Connection Diagram



Order Number ;
 DM74S473 N or DM74S472 N
 See NS Package N20A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S473/472	4.50	5.50	V
DM74S473/472	4.75	5.25	V
Ambient Temperature (TA)			
DM54S473/472	-55	+125	C
DM74S473/472	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S473/472			DM74S473/472			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHz, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		110	155		110	155	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V			+50			+50	uA
	Chip Disabled			-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S473/472			DM74S473/472			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		40	75		40	60	nS
TEA Enable Access Time	TEVQV		15	35		15	30	nS
TER Enable Recovery Time	TEXQX		15	35		15	30	nS
TZX Output Enable Time	TEVQX		15	35		15	30	nS
TXZ Output Disable Time	TEXQZ		15	35		15	30	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.

All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.

Permanent damage may otherwise result.

DM54/74S473A, DM54/74S472A (512x8) 4096-BIT TTL PROMs

General Description

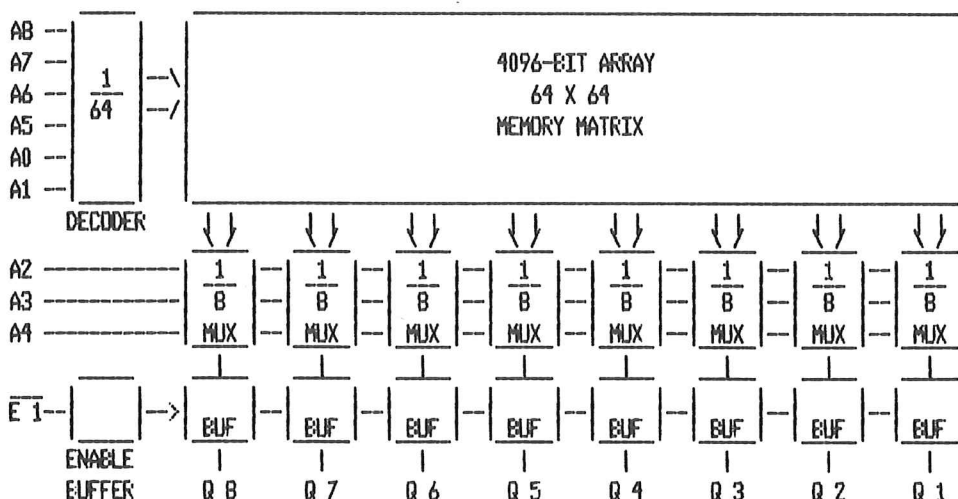
These Schottky memories are organized in the popular 512 words by 8 bits configuration. A memory enable input is provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

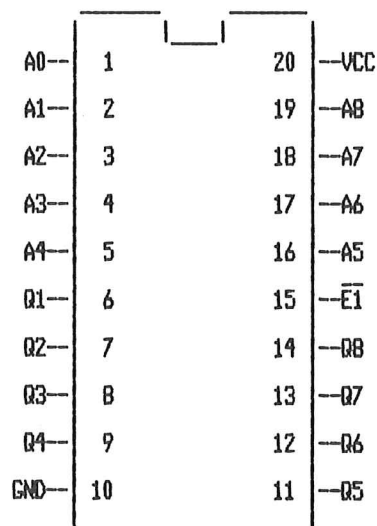
- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S473A		X	X		N,J
DM74S472A		X		X	N,J
DM54S473A	X		X		J
DM54S472A	X			X	J

Block diagram



Connection Diagram



Order Number ;

DM74S473AJ, DM74S472AJ,
DM54S473AJ, or DM54S472AJ
See NS Package J20B

Order Number ;

DM74S473AN or DM74S472AN
See NS Package N20A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65, to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S473A/472A	4.50	5.50	V
DM74S473A/472A	4.75	5.25	V
Ambient Temperature (TA)			
DM54S473A/472A	-55	+125	C
DM74S473A/472A	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S473A/472A			DM74S473A/472A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	µA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	µA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	µA
	VCC=Max, VCEX=5.5V			100			100	µA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHz		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHz, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		110	155		110	155	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V			+50			+50	µA
	Chip Disabled			-50			-50	µA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S473A/472A			DM74S473A/472A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		30	60		30	45	nS
TEA Enable Access Time	TEVQV		15	35		15	25	nS
TER Enable Recovery Time	TEXQX		15	35		15	25	nS
TZX Output Enable Time	TEVQX		15	35		15	25	nS
TXZ Output Disable Time	TEXQZ		15	35		15	25	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.

All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.

Permanent damage may otherwise result.

National Semiconductor

DM54/74S572, DM54/74S573
(1024x4) 4096-BIT TTL PROM's

General Description

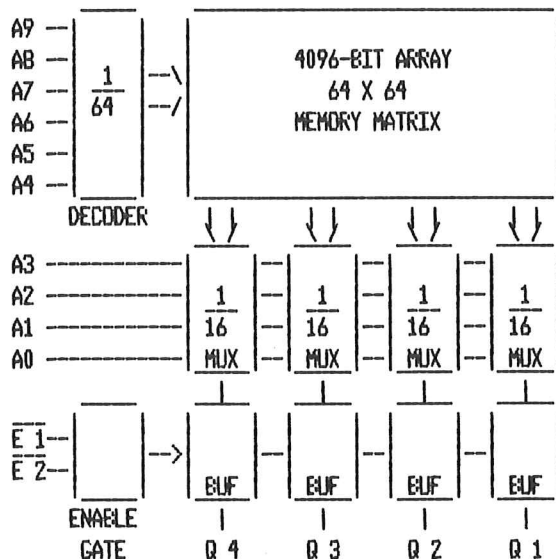
These Schottky memories are organized in the popular 1024 words by 4 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 4 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

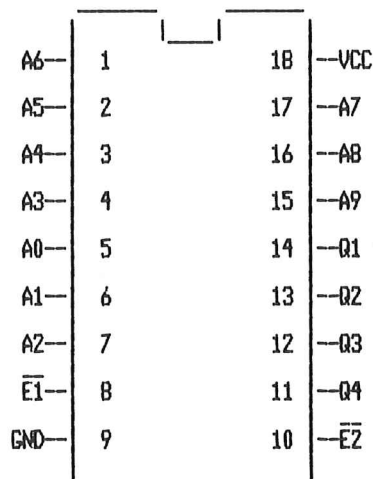
- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-20 nS typ
 - Enable recovery-20 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S572		X	X		N,J
DM74S573		X		X	N,J
DM54S572	X		X		J
DM54S573	X			X	J

Block diagram



Connection Diagram



Order Number ;

DM74S572 J, DM74S573 J,
DM54S572 J, or DM54S573 J
See NS Package J18A

Order Number ;

DM74S572 N or DM74S573 N
See NS Package N18A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S572/573	4.50	5.50	V
DM74S572/573	4.75	5.25	V
Ambient Temperature (TA)			
DM54S572/573	-55	+125	C
DM74S572/573	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S572/573			DM74S572/573			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	µA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	µA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	µA
	VCC=Max, VCEX=5.5V			100			100	µA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHZ, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		100	140		100	140	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V Chip Disabled			+50			+50	µA
				-50			-50	µA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S572/573			DM74S572/573			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		40	75		40	60	nS
TEA Enable Access Time	TEVQV		20	45		20	35	nS
TER Enable Recovery Time	TEXQX		20	45		20	35	nS
TZX Output Enable Time	TEVQX		20	45		20	35	nS
TXZ Output Disable Time	TEXQZ		20	45		20	35	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.

All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.

Permanent damage may otherwise result.



National Semiconductor

PRELIMINARY

DM54/74S572A, DM54/74S573A (1024x4) 4096-BIT TTL PROMs

General Description

These Schottky memories are organized in the popular 1024 words by 4 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 4 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions.

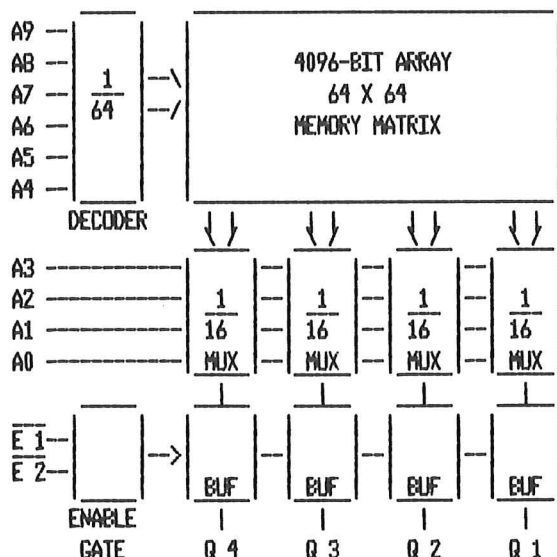
PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-30 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

	Military	Commercial	Open-Collector	TRI-STATE	Package
DM74S572A		X	X		N,J
DM74S573A		X		X	N,J
DM54S572A	X		X		J
DM54S573A	X			X	J

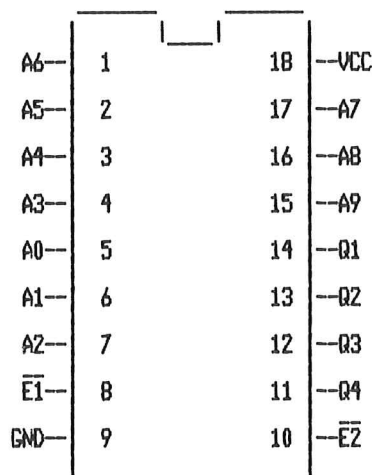
Block diagram



Order Number ;

DM74S572AJ, DM74S573AJ,
DM54S572AJ, or DM54S573AJ
See NS Package J18A

Connection Diagram



Order Number ;

DM74S572AN or DM74S573AN
See NS Package N18A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM54S572A/573A	4.50	5.50	V
DM74S572A/573A	4.75	5.25	V
Ambient Temperature (TA)			
DM54S572A/573A	-55	+125	C
DM74S572A/573A	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM54S572A/573A			DM74S572A/573A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHZ, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		100	140		100	140	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V Chip Disabled			+50			+50	uA
				-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM54S572A/573A			DM74S572A/573A			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		30	60		30	45	nS
TEA Enable Access Time	TEVQV		15	35		15	25	nS
TER Enable Recovery Time	TEXQX		15	35		15	25	nS
TZX Output Enable Time	TEVQX		15	35		15	25	nS
TXZ Output Disable Time	TEXQZ		15	35		15	25	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.
For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.
All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.
Permanent damage may otherwise result.

National Semiconductor

DM77/87S180 ,DM77/87S181
(1024x8) 8192-BIT TTL PROMs

General Description

These Schottky memories are organized in the popular 1024 words by 8 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions.

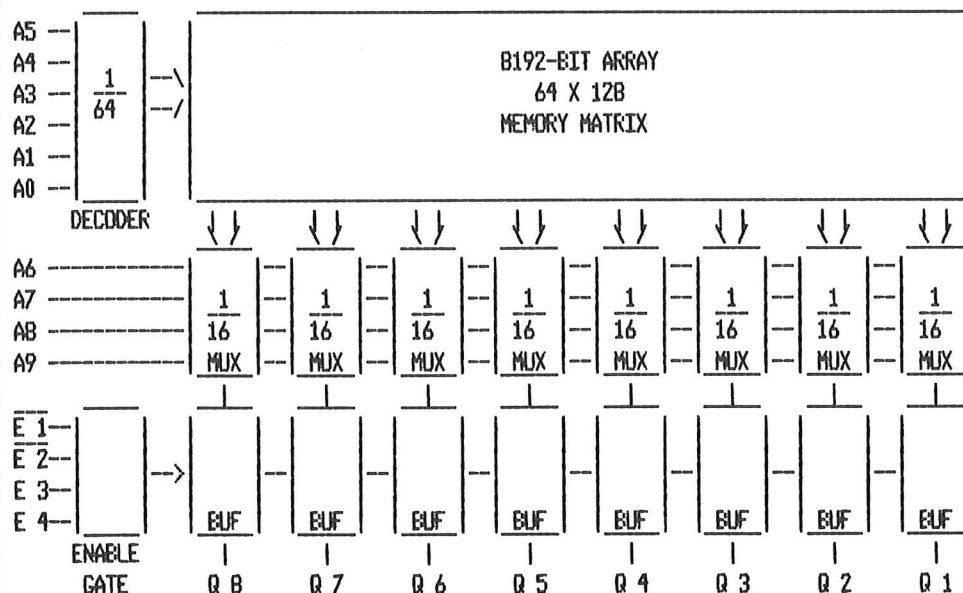
PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

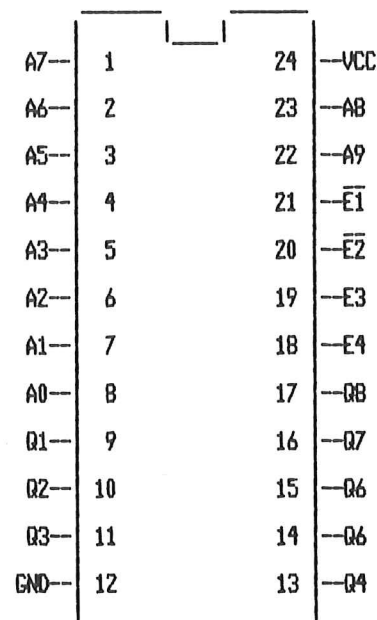
	Military	Commercial	Open-Collector	TRI-STATE	Package
DM87S180		X	X		N,J
DM87S181		X		X	N,J
DM77S180	X		X		J
DM77S181	X			X	J

Block diagram



Order Number ;
DM87S180 J, DM87S181 J,
DM77S180 J, or DM77S181 J
See NS Package J24A

Connection Diagram



Order Number ;
DM87S180 N or DM87S181 N
See NS Package N24A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM77S180/181	4.50	5.50	V
DM87S180/181	4.75	5.25	V
Ambient Temperature (TA)			
DM77S180/181	-55	+125	C
DM87S180/181	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM77S180/181			DM87S180/181			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHZ, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		115	170		115	170	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V			+50			+50	uA
	Chip Disabled			-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM77S180/181			DM87S180/181			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		40	75		40	55	nS
TEA Enable Access Time	TEVQV		15	35		15	30	nS
TER Enable Recovery Time	TEXQX		15	35		15	30	nS
TZX Output Enable Time	TEVQX		15	35		15	30	nS
TXZ Output Disable Time	TEXQZ		15	35		15	30	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.

All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.

Permanent damage may otherwise result.

National Semiconductor

**DM77/87S184 ,DM77/87S185
(2048x4) 8192-BIT TTL PROMs**

General Description

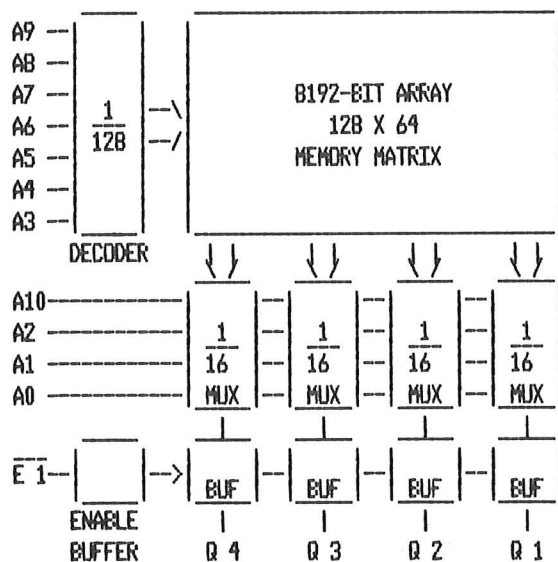
These Schottky memories are organized in the popular 2048 words by 4 bits configuration. A memory enable input is provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 4 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions. PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-15 nS typ
 - Enable recovery-15 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

	Military	Commercial	Open-Collector	TRI-STATE	Package
DM87S184		X	X		N,J
DM87S185		X		X	N,J
DM77S184	X		X		J
DM77S185	X			X	J

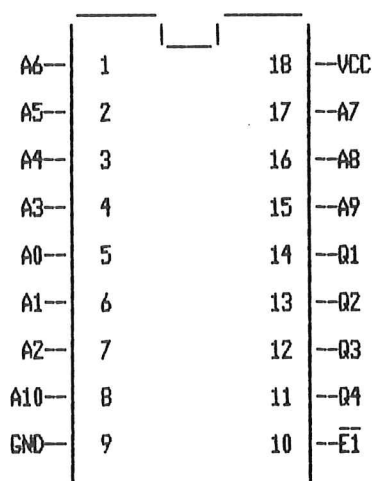
Block diagram



Order Number ;

DM87S184 J, DM87S185 J,
DM77S184 J, or DM77S185 J
See NS Package J18A

Connection Diagram



Order Number ;

DM87S184 N or DM87S185 N
See NS Package N18A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM77S184/185	4.50	5.50	V
DM87S184/185	4.75	5.25	V
Ambient Temperature (TA)			
DM77S184/185	-55	+125	C
DM87S184/185	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM77S184/185			DM87S184/185			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=16mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHZ, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		100	140		100	170	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V Chip Disabled			+50			+50	uA
				-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM77S184/185			DM87S184/185			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		40	75		40	55	nS
TEA Enable Access Time	TEVQV		15	35		15	30	nS
TER Enable Recovery Time	TEXQX		15	35		15	30	nS
TZX Output Enable Time	TEVQX		15	35		15	30	nS
TXZ Output Disable Time	TEXQZ		15	35		15	30	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise. All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded. Permanent damage may otherwise result.

National Semiconductor

**DM77/87S190 ,DM77/87S191
(2048x8) 16384-BIT TTL PROMs**

General Description

These Schottky memories are organized in the popular 2048 words by 8 bits configuration. Memory enable inputs are provided to control the output states. When the device is enabled, the outputs represent the contents of the selected word. When disabled, the 8 outputs go to the 'OFF' or high impedance state. The memories are available in both open-collector and TRI-STATE versions.

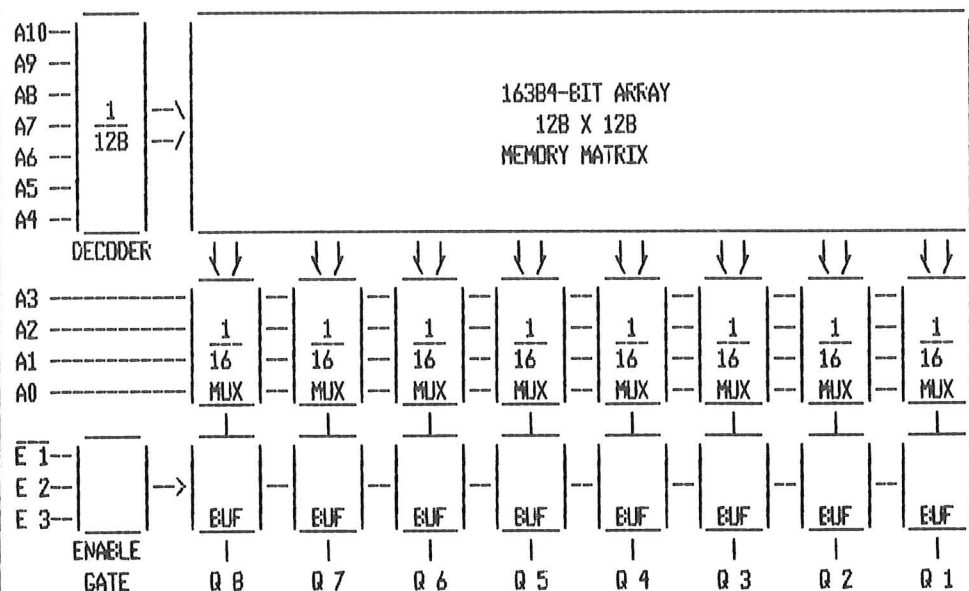
PROMs are shipped from the factory with lows in all locations. A high may be programmed into any selected location by following the programming instructions.

Features

- * Advanced titanium-tungsten (Ti-W) fuses
- * Schottky-clamped for high speed
 - Address access-40 nS typ
 - Enable access-20 nS typ
 - Enable recovery-20 nS typ
- * PNP inputs for reduced input loading
- * All DC and AC parameters guaranteed over temperature
- * Low voltage TRI-SAFE programming

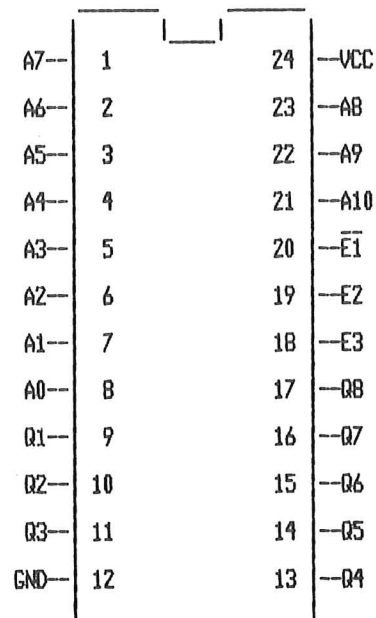
	Military	Commercial	Open-Collector	TRI-STATE	Package
DM87S190		X	X		N,J
DM87S191		X		X	N,J
DM77S190	X		X		J
DM77S191	X			X	J

Block diagram



Order Number ;
DM87S190 J, DM87S191 J,
DM77S190 J, or DM77S191 J
See NS Package J24A

Connection Diagram



Order Number ;
DM87S190 N or DM87S191 N
See NS Package N24A

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply voltage (Note 2)	-0.5 to +7.0V
Input voltage (Note 2)	-1.2 to +5.5V
Output voltage (Note 2)	-0.5 to +5.5V
Storage Temperature	-65. to +150 C
Lead Temperature (10 Seconds)	300 C

OPERATING CONDITIONS

	MIN	MAX	UNITS
Supply voltage (VCC)			
DM77S190/191	4.50	5.50	V
DM87S190/191	4.75	5.25	V
Ambient Temperature (TA)			
DM77S190/191	-55	+125	C
DM87S190/191	0	+70	C
Logical '0' Input Voltage	0	0.8	V
Logical '1' Input Voltage	2.0	5.5	V

DC ELECTRICAL CHARACTERISTICS (Note 3)

PARAMETERS	CONDITIONS	DM77S190/191			DM87S190/191			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
IIL Input Load Current	VCC=Max, VIN=0.45V		-80	-250		-80	-250	uA
IIH Input Leakage Current	VCC=Max, VIN=2.7V			25			25	uA
	VCC=Max, VIN=5.5V			1.0			1.0	mA
VOL Low Level Output Voltage	VCC=Min, IOL=12mA		0.35	0.50		0.35	0.45	V
VIL Low Level Input Voltage				0.80			0.80	V
VIH High Level Input Voltage		2.0			2.0			V
IOZ Output Leakage Current (Open-Collector Only)	VCC=Max, VCEX=2.4V			50			50	uA
	VCC=Max, VCEX=5.5V			100			100	uA
VC Input Clamp Voltage	VCC=Min, Iin=-18mA		-0.8	-1.2		-0.8	-1.2	V
CI Input Capacitance	VCC=5.0, Vin=2.0V TA=25 C, 1MHZ		4.0			4.0		pF
CO Output Capacitance	VCC=5.0V, VO=2.0V TA=25 C, 1MHZ, Outputs Off		6.0			6.0		pF
ICC Power Supply Current	VCC=Max, Inputs Grounded All Outputs Open		120	175		120	175	mA

TRI-STATE PARAMETERS

IOS Short Circuit Output Current	VO=0V, VCC=Max (Note 4)	-20		-70	-20		-70	mA
IOZ Output Leakage (TRI-STATE)	VCC=Max, VO=0.45 to 2.4V Chip Disabled			+50			+50	uA
				-50			-50	uA
VOH Output Voltage High	IOH=-2.0mA	2.4	3.2					V
	IOH=-6.5mA				2.4	3.2		V

AC ELECTRICAL CHARACTERISTICS (With Standard Load and Operating Conditions)

PARAMETERS	JEDEC SYMBOL	DM77S190/191			DM87S190/191			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
TAA Address Access Time	TAVQV		40	80		40	65	nS
TEA Enable Access Time	TEVQV		20	40		20	30	nS
TER Enable Recovery Time	TEXQX		20	40		20	30	nS
TZX Output Enable Time	TEVQX		20	40		20	30	nS
TXZ Output Disable Time	TEXQZ		20	40		20	30	nS

Note 1: Absolute maximum ratings are those values beyond which the device may be permanently damaged. They do not mean that the device may be operated at these values.

Note 2: These limits do not apply during programming.

For the programming ratings, refer to the programming instructions.

Note 3: These limits apply over the entire operating range unless stated otherwise.

All typical values are for VCC=5.0V and TA=25 C.

Note 4: During IOS measurement, only one output at a time should be grounded.

Permanent damage may otherwise result.

Schottky PROM Programming Procedure

National Schottky PROMs are shipped from the factory with all fuses intact. As a result, the outputs will be low (logical '0') for all addresses. To generate high (logical '1') levels at the outputs, the device must be programmed. Information regarding commercially available programming equipment may be obtained from National. If it is desired to build your own programmer, the following conditions must be observed.

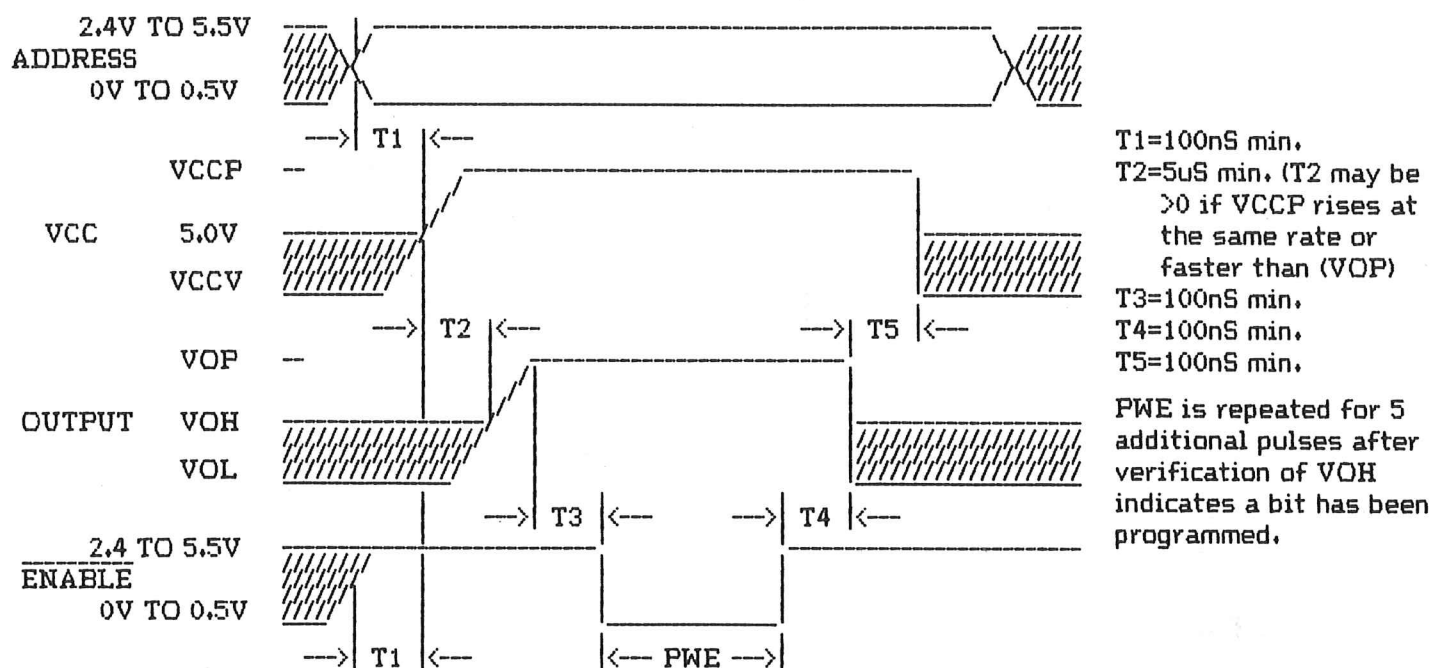
1. Programming should be attempted only at ambient temperatures between 15 and 30 degrees Celsius.
2. Address and Enable inputs must be driven with TTL logic levels during programming and verification.
3. Programming will occur at the selected address when VCC is at 10.5 Volts, and at the selected bit location when the output pin, representing that bit, is at 10.5 Volts, and the device is subsequently enabled. To achieve these conditions in the appropriate sequence, the following procedure must be followed:
 - a) Select the desired word by applying high or low levels to the appropriate address inputs. Disable the device by applying a high level to one or more 'active low' chip Enable inputs.
 - b) Increase VCC from nominal to 10.5 Volts (plus or minus 0.5V) with a slew rate between 1.0 and 10.0 V/uS. Since VCC is the source of the current required to program the fuse as well as the ICC for the device at the programming voltage, it must be capable of supplying 750 mA at 11.0 volts.
 - c) Select the output where a logical high is desired by raising that output voltage to 10.5 Volts (plus or minus 0.5V). Limit the slew rate from 1.0 to 10.0 V/uS. This voltage change may occur simultaneously with the increase in VCC, but must not precede it. It is critical that only one output at a time be programmed since the internal circuits can only supply programming current to one bit at a time. Outputs not being programmed must be left open or connected to a high impedance source of 20K OHMs minimum (Remember that the outputs of the device are disabled at this time).
 - d) Enable the device by taking the chip Enable(s) to a low level. This is done with a pulse of 10 uS. The 10 uS duration refers to the time that the circuit (device) is enabled. Normal input levels are used and rise and fall times are not critical.
 - e) Verify that the bit has been programmed by first removing the programming voltage from the output and then reducing VCC to 4.0 Volts (plus or minus 0.2V). Verification at a VCC level of 4.0 Volts will guarantee proper output states over the VCC and temperature range of the programmed part. The device must be Enabled to sense the state of the outputs. During verification, the loading of the output must be within specified IOL and IOH limits. Steps b, c, and d must be repeated up to 10 times or until verification that the bit has been programmed.
 - f) Following verification, apply five additional programming pulses to the bit being programmed. The programming procedure is now complete for the selected bit.
 - g) Repeat steps a through f for each bit to be programmed to a high level. If the procedure is performed on an automatic programmer, the duty cycle of VCC at the programming voltage must be limited to a maximum of 25%. This is necessary to minimize device junction temperatures. After all selected bits are programmed, the entire contents of the memory should be verified.

Note: Since only an enabled device is programmed, it is possible to program these parts at the board level if all programming parameters are complied with.

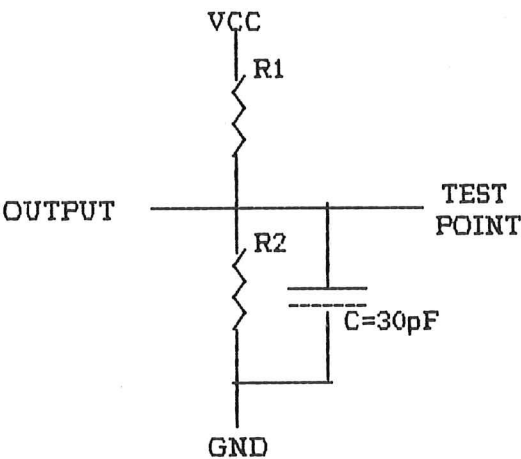
Programming Parameters Do not test or you may program the device

Parameters	Conditions	Min.	Recommended Value	Max.	Units
VCCP Required VCC for Programming		10.0	10.5	11.0	V
ICCP ICC During Programming	VCC=11V			750	mA
VOP Required Output Voltage for Programming		10.0	10.5	11.0	V
IOP Output Current while Programming	Vout=11V			20	mA
IRR Rate of Voltage Change of VCC or Output		1.0		10.0	V/ μ S
PWE Programming Pulse Width (Enabled)		9	10	11	μ S
VCCV Required VCC for Verification		3.8	4.0	4.2	V
MDC Maximum Duty Cycle for VCC at VCCP			25	25	%

Programming Waveforms

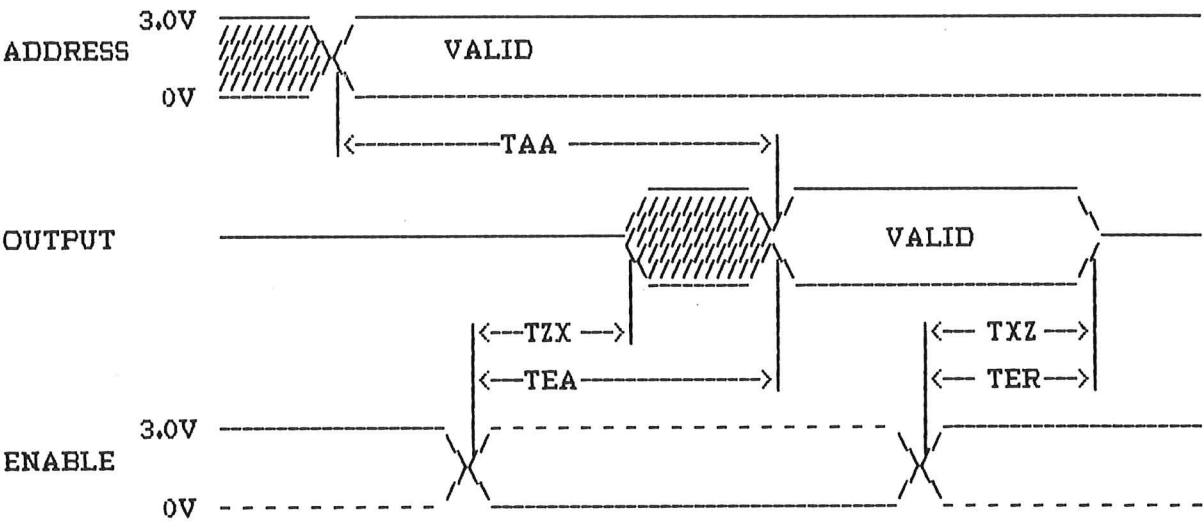


Standard Test Load



- * Device input waveform characteristics are;
Repetition rate = 1 MHz
Source impedance = 50 Ohms
Rise and Fall times = 2.5 nS maximum (1.0 to 2.0 Volt levels)
- * TAA is measured with stable enable inputs.
- * TEA and TER are measured from the 1.5 Volt level on inputs and outputs with all address and enable inputs stable at applicable levels.
- * For IOL=16 mA, R1=300 Ohms and R2=600 Ohms.
For IOL=12 mA, R1=400 Ohms and R2=800 Ohms.
- * 'C' includes scope and jig capacitance.

Switching Time Waveforms



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